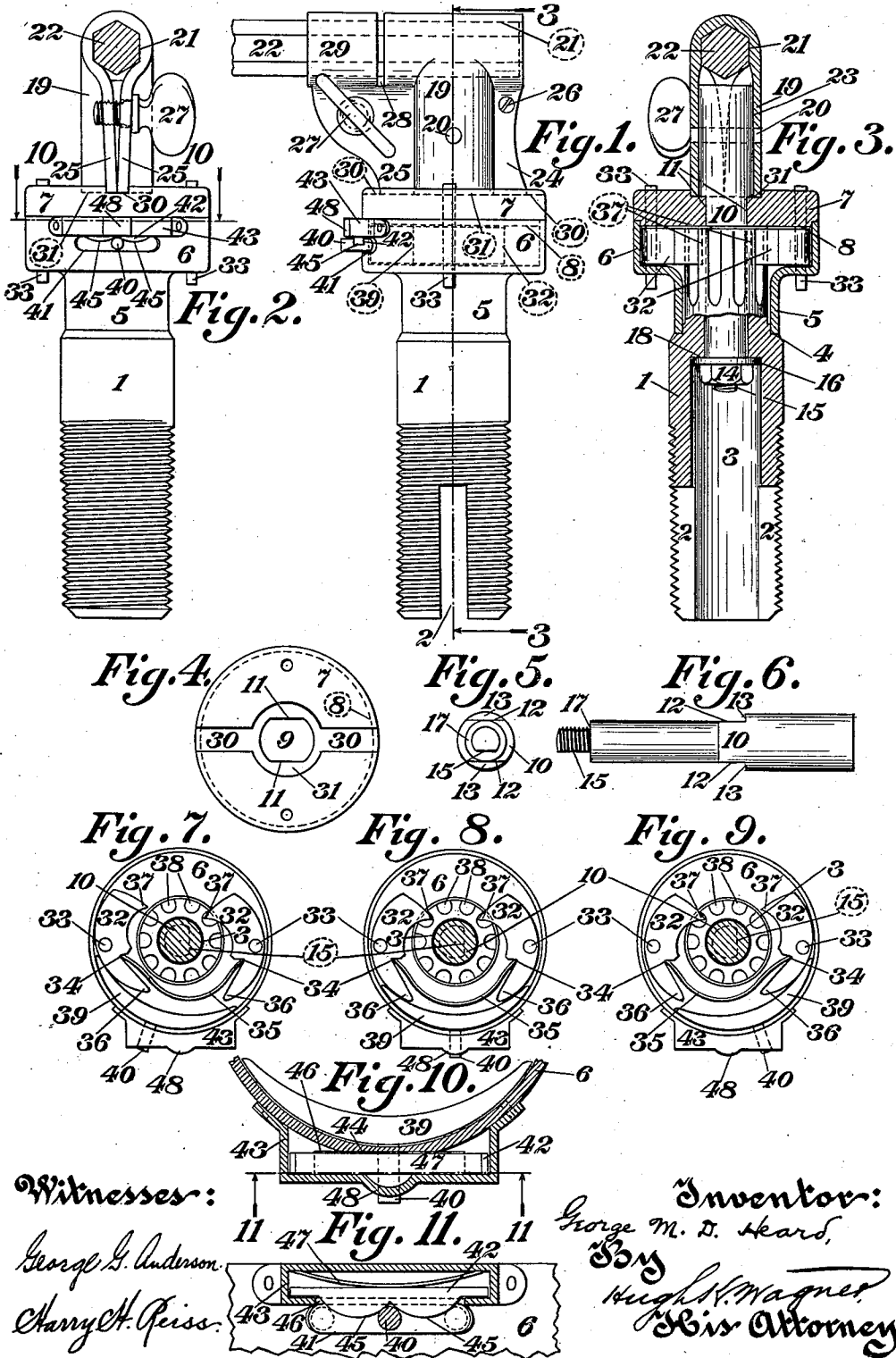


G. M. D. HEARD.
 RATCHET BRACE.
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1,011,782.

Patented Dec. 12, 1911.



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UNITED STATES PATENT OFFICE.

GEORGE M. D. HEARD, OF NIAGARA FALLS, NEW YORK.

RATCHET-BRACE.

1,011,782.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GEORGE M. D. HEARD, a citizen of the United States, residing at the city of Niagara Falls, in the county of Niagara and State of New York, have invented certain new and useful Improvements in Ratchet-Braces, of which the following is a specification.

This invention relates to ratchet braces, particularly to an improved form of ratchet means adapted to be used in connection with the brace illustrated in my prior United States Patent No. 779,079, issued January 3, 1905.

In the accompanying drawings forming part of this specification, in which like numbers of reference denote like parts wherever they occur, Figure 1 is a side elevation of my improved ratchet means in connection with the lower sweep-arm of a brace; Fig. 2 is an end elevation of same; Fig. 3 is a sectional view on the line 3—3, Fig. 1, the parts within the device being shown in elevation; Fig. 4 is a top plan view of the cap; Figs. 5 and 6 are detailed views of the ratchet spindle; Figs. 7, 8, and 9 are interior views of the cup, showing the three positions of the pawl-actuating slide; Fig. 10 is a sectional view, on an enlarged scale, on the line 10—10, Fig. 2; and Fig. 11 is a sectional view on the line 11—11, Fig. 10.

As is usual in braces of the type hereinabove referred to, the chuck 1 is externally screw-threaded, so as to receive a revoluble adjusting-and-tightening drum (not shown in the drawings). Slots 2 are cut deeply therein to receive the clamping jaws (not shown), which are adjusted and tightened by the revoluble drum. The chuck 1 contains an opening 3 that extends longitudinally therethrough, and is provided with an annular shoulder 4 that is formed on the upper part thereof. The part of the chuck 1 that extends above the shoulder 4 is fluted and is preferably smaller diametrically than the lower part of the chuck, so as to fit into the neck 5 of the cup 6, which is capable of rotating about the fluted part of the chuck, said neck being diametrically smaller than the cup proper and being preferably formed integrally with the bottom of said cup. Said cup may be stamped from sheet-metal or formed in any other suitable manner. The fluted end of chuck 1 extends into the interior of cup 6 and terminates adjacent the cap 7 which closes the upper end of said cup.

The cap 7 bears a circular projection 8, which protrudes into the upper end of cup 6, and contains an opening 9 through which the ratchet spindle 10 extends, said opening having a flattened side or sides 11 to fit closely to the flattened side or sides 12 of spindle 10, in order to prevent said spindle from turning within said opening. The spindle 10 is preferably formed of a round bar of metal, so as to sustain all the strains to which same is subjected in a ratchet brace of this character. The upper part of spindle 10 extends above the cap 7 and bears the shoulders 13 which rest upon the top of said cap. The lower part of spindle 10 extends into the upper part of opening 3 in chuck 1 and is capable of rotating therein. The lower end of spindle 10 is externally screw-threaded to receive a nut 14 and is flattened at 15 on one side thereof to allow a D-shaped washer 16 to fit thereon. The washer 16 is held against an annular shoulder 17 on spindle 10, and overlaps an annular offset 18 in opening 3, thereby not only supporting the chuck 1, but holding the cap 7 firmly in place on cup 6.

The part of spindle 10 that projects above cap 7 has an elbow 19 secured thereto by a pin 20 or any other suitable means. The elbow 19 is composed of a one-piece plate that may be formed into the desired shape by a sheet-metal press (not shown) or any other suitable means. The one-piece plate is bent about a middle axis or former (not shown) to leave a hexagonal opening 21 which extends horizontally between the two sides of the elbow, in order to receive the lower hexagonal sweep-arm 22 of the above-mentioned brace. The two sides of the elbow are pressed together so that their lower parts preferably touch each other, a suitable former (not shown) being held between the two sides, so as to form the vertical opening 23 in which the upper part of spindle 10 is secured, as hereinabove described. The parts of the elbow 19, between which the openings 21 and 23 extend, are connected by the so-called webs 24 and 25 that are arranged in pairs. The webs 24 and 25 are preferably arranged to touch each other, respectively, along the lower parts thereof, and the upper parts of said webs are slightly sprung apart, the upper parts of webs 24 being connected by a screw 26 or other suitable means, and the upper parts of webs 25 being connected by a

thumb-screw 27. The part of the elbow 19, through which the sweep-arm 22 extends, is severed transversely at 28 above the webs 25, so as to separate the end portion 29 partly from the main portion of the elbow. The thumb-screw 27 underlies the end portion 29 and affords a means by which the webs 25 can be drawn together in order to cause the end portion 29 to clamp the sweep-arm 22 rigidly in place. By this arrangement the thumb-screw 27 can be tightened with a relatively small amount of pressure, in order to clamp the sweep-arm 22 strongly and rigidly in place, and, when loosened, allows the easy and convenient adjustment to reduce the sweep of the brace or to knock down the brace for shipment or assemble same for use.

The lower edges of the two sides of the elbow 19 seat in a pair of grooves 30 and a depression 31 in the top of cap 7, the lower edges of the webs 24 and 25 fitting snugly in the grooves 30, respectively, and the sides of the depression 31 being arranged to embrace the lower edges of the parts which encircle the spindle 10. The result of this construction is that the webs 24 and 25 bear upon the cap 7 on opposite sides of spindle 10 so that the strains to which the elbow 19 is subjected, when the brace is used, are transmitted to the cap 7 through the medium of webs 24 and 25, thereby reducing the torsion of spindle 10 and the shearing-stress upon pin 20 to a minimum, while at the same time the webs 24 and 25 prevent the spindle 10 from being bent by the weight upon the brace.

A pair of pawls 32 is pivotally fastened in cup 6 by means of pins 33 which pass through openings in the bottom of said cup and, also, in cap 7. The pawls 32 are located on opposite sides of the fluted part of chuck 1 and arranged to face toward each other, each of said pawls being provided with a notch 34 in which an end of a spring 35 seats. The pressure of spring 35 tends to force the tails 36 of said pawls farther apart and thereby move the noses 37 of said pawls toward each other, so as to cause each nose to enter a furrow 38 in the fluted part of chuck 1. A cam slide 39, the ends of which are preferably tapered, is arranged within the cup 6, so as to have an arcual path of movement adjacent the side of said cup. A pin 40 borne by the slide 39 extends through a slot 41 in the side of the cup 6 and affords a means by which the slide can be operated from the outside of the cup. The cam slide 39 is adapted to have three positions, viz., one central and two end positions. When the slide 39 occupies the central position, as depicted in Fig. 8, the ends thereof project between the tails 36 of both pawls 32 and the side of the cup 6, but do not exert any pressure against the tails of said pawls, whereby

the pressure of spring 35 holds the nose 36 of each pawl in a furrow 38 of chuck 1, with the result that the cup 6 and chuck 1 are locked together so as to rotate in unison. When, however, the slide 39 is moved to either side of the central position, one end thereof moves away from the tail 36 of one pawl 32 and thereby leaves the nose 37 of said pawl in a furrow 38, and the other end of said slide moves farther between the tail 36 of the other pawl 32 and thereby rotates same, so as to withdraw its nose 37 from a furrow 38 of chuck 1, thus permitting only one pawl to engage the fluted part of said chuck. When only one of the pawls 32 is allowed to engage the fluted part of the chuck 1, as just described, the chuck 1 rotates with the cup 6, when the latter is rotated in one direction, but, when said cup is rotated in the opposite direction, the nose of said pawl rides loosely over the fluted part of chuck 1, whereby said chuck remains stationary and the cup 1 rotates alone. For example, if the slide occupies a position to the left of the central position, as depicted in Fig. 7, the pawl 32 on the left-hand side of chuck 1 is held out of engagement with the fluted part of chuck 1, and the other pawl 32, which is left in engagement with the fluted part of chuck 1, not only causes the chuck 1 and cup 6 to rotate in unison, when the cup is rotated in a counter-clockwise direction, but allows said cup to rotate alone in a clockwise direction, and, if the slide occupies a position on the right-hand side of the central position, as illustrated in Fig. 9, the movements of the parts as just described will be reversed.

In order to hold the slide 39 in any one of the three positions which same can occupy, as hereinabove described, any suitable locking device may be provided, but, for the purpose of illustration, a plate 42 is used that is contained in a small cup or receptacle 43, the latter being riveted or otherwise secured to the side of cup 6. The plate 42 fits against a flattened side 44 of cup 6 and bears a pair of cam surfaces 45 that project through a slot 46. A spring 47 is arranged to exert its pressure upon plate 42, so as to cause the cam surfaces 45 to project into the path of movement of pin 40. The cam surfaces 45 meet to form a notch 47 in which the pin 40 is held, when the slide 39 occupies the central position. Whenever the pin 40 is moved to either side of the central position, as depicted in dotted lines, Fig. 11, the cam surface 45 on that particular side holds said pin in an end of slot 41 and thereby locks the slide 39 in position to hold one of the pawls 32 out of engagement with the fluted part of chuck 1. To afford a means by which the operator can readily ascertain by touch the position of pin 40 relative to its central position,

the cup 43 is preferably provided with a convex projection 48 which is located above the central position of said pin.

The operation of the device is largely evident from the foregoing description, but may be summarized as follows: The proper tool being clamped in the usual manner in the chuck 1 and the lower sweep-arm 22 of the brace being adjusted to obtain the desired sweep for the brace, the thumb-screw 27 is tightened to hold said sweep-arm firmly in position in the elbow 19. If it is desired to have the tool rotate, no matter in which direction the handle of the brace is swung, the pin 40 is moved to the central position, thus allowing the noses 37 of both pawls 32 to seat in furrows 38 in the fluted part of chuck 1 and lock said chuck and cup 6 together at all times. When the operator desires to use the device as a ratchet brace, so that the handle of the brace and the cup 6 can move in one direction in unison with the chuck 1 and the tool, and in the other direction independently thereof, the pin 40 is moved to one side or the other of the central position, so as to move one of the pawls 30 out of engagement with the fluted part of chuck 1, according to the direction in which movement in unison is desired.

I claim:

1. In a ratchet brace, the combination of a chuck, ratchet means in the head thereof, a cup-shaped member rotatable about the head of said chuck, a cover for closing the end of said member, pawls pivoted in said member and engaging said ratchet, and a cam slide for actuating said pawls, the pivots for said pawls being supported by said member and said cover, thereby to hold said cover in place.

2. In a ratchet brace, the combination of a hollow member having a slot in its wall, a slidable pawl-actuating cam member, a pin borne by said cam member by means of which said cam member is actuated, said pin extending through the slot in said hollow member, a cam plate for locking said pin in position, and a spring for holding said cam plate in the path of movement of said pin.

3. In a ratchet brace, the combination of a hollow member having a slot in its wall, a slidable pawl-actuating cam member, a pin borne by said cam member by means of which said cam member is actuated, said pin extending through the slot in said hollow member, a cam plate for locking said pin in position, a spring for holding said cam plate in the path of movement of said pin, and a casing secured to said hollow member and supporting said cam plate and said spring.

4. In combination with the lower sweep-arm of a ratchet brace, a chuck-holder, a spindle projecting from the top of said

chuck-holder, said spindle being united to said sweep-arm by an elbow, the latter containing a horizontal and a vertical perforation formed by bending a piece of metal and bringing the lower edges thereof together, said spindle being secured in the vertical perforation, said sweep-arm fitting into the horizontal perforation, and a thumb-screw connecting the two sides of said elbow, thereby to clamp said sweep-arm in place, the part of said elbow that surrounds the horizontal perforation being transversely severed to permit of easy clamping of said sweep-arm.

5. In combination with the lower sweep-arm of a ratchet brace, a chuck-holder, a spindle projecting from the top of said chuck-holder, an elbow containing a horizontal and a vertical perforation, said sweep-arm being adjustably secured in the horizontal perforation, said spindle being rigidly secured in the vertical perforation, and said elbow having webs that rest upon the top of said chuck-holder on opposite sides of said spindle.

6. In combination with the lower sweep-arm of a ratchet brace, a chuck-holder, a spindle projecting from the top of said chuck-holder, an elbow containing a horizontal and a vertical perforation, said sweep-arm being adjustably secured in the horizontal perforation, said spindle being rigidly secured in the vertical perforation, and said elbow having webs that rest upon the top of said chuck-holder on opposite sides of said spindle, the top of said chuck-holder having a depression and grooves in which the lower edges of said elbow seat.

7. In combination with the lower sweep-arm of a ratchet brace, a chuck-holder, a spindle projecting from the top of said chuck-holder, an elbow containing a horizontal and a vertical perforation, said sweep-arm being adjustably secured in the horizontal perforation, said spindle being rigidly secured in the vertical perforation, and said elbow having webs that rest upon the top of said chuck-holder on opposite sides of said spindle, said webs being disposed approximately vertical in the plane of said sweep-arm.

8. In a ratchet brace, in combination with a shouldered chuck, a spindle rotatably secured to said chuck, said chuck being formed with ratchet teeth, and said spindle having a flattened portion, a cap having a central opening to receive said flattened portion of the spindle, a cup having its upper end engaged with said cap and having its lower end contracted and engaged with said shoulder of the chuck, and pawls disposed between said cap and the contracted end of the cup for engagement with said ratchet teeth.

9. In a ratchet brace, in combination

with a chuck, a spindle rotatably secured to the chuck, said chuck having ratchet teeth, a head on the chuck having pawls to engage said ratchet teeth of the chuck, an elbow having a vertical part received over the upper end of said spindle and rigidly secured thereto, said elbow having a pair of webs on each side of said vertical part of the elbow, the horizontal part of said elbow on one side of said vertical part thereof and above the adjacent webs being formed with a transverse slit, means to secure the upper ends of each pair of webs to each other, the lower ends of each pair of webs being in contact, the lower end of said vertical part of the elbow and the lower ends of each pair of webs being received in grooves provided therefor in the upper end of said chuck head.

10. In a ratchet brace, in combination with a chuck having a head and a spindle rotatably related to said chuck with a pawl and ratchet means in the head between the latter and the chuck, an elbow having a vertical socket secured to the upper end of the spindle and formed with webs on opposite sides of said socket to brace the latter, the upper end of said head having a depression to conformably receive the lower end of said socket and having opposite grooves to receive the lower ends of said webs.

11. In a ratchet brace, in combination with a chuck and rotating means therefor including pawls, a member for actuating

said pawls, a pin borne by said member, and means to engage said pin to hold same in the position to which said member may be moved including a sliding spring pressed plate formed with a series of depressions in which latter said pin is received.

12. In a ratchet brace, a chuck having a shoulder thereon, a spindle rotatably secured to the chuck, said chuck having ratchet teeth, said spindle being provided with a shoulder below its upper end, a hollow head mounted on the chuck to engage said shoulder thereof at one end and to engage said shoulder of the spindle at its opposite end, pawls on the interior of the head engaging said ratchet teeth of the chuck, and means carried by the sweep arm of the brace to receive said end of the spindle above the shoulder thereof, said means abutting the outer end of the head.

13. In a ratchet brace, a chuck, a hollow head carried by the chuck and having means on its interior to engage and rotate the chuck, and means carried by the sweep arm of the brace for securing the chuck to said sweep arm, said means having its lower end conformably received in a depression provided therefor, in the outer end of said head.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

GEORGE M. D. HEARD.

Witnesses:

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OTTO SCHABOLD.